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THE EFFICACY OF STIMULUS FADING AND CONTINGENCY MANAGEMENT IN THE TREATMENT OF ELECTIVE MUTISM: A CASE STUDY[1]

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Stimulus fading techniques were compared to those of contingency management in the treatment of a 6-yr-old, electively mute girl. Experimental periods consisted of the mother rewarding the child for verbal and motor responses to scheduled tasks, while a stranger slowly entered the room and then gradually administered the task items as mother left the room. A timeout contingency for non-response to task items was also employed. Control periods consisted of a stranger administering the same tasks to the child under the same contingencies but without the presence of the mother or the use of stimulus fading. Experimental and control periods were alternated during each treatment hour. The stimulus fading procedure was found to be a necessary component of the treatment process. While the timeout contingency for non-response was found to facilitate treatment if combined with stimulus fading, it was completely ineffective without the stimulus fading.

The term "elective or selective mute" refers to a person who will speak only in restricted stimulus settings. Usually, an electively mute child will exhibit adequate verbal behavior with its family in the home setting but will remain silent in the presence of other persons outside the home. Stimulus control refers to the extent to which the presence or absence of a stimulus controls the probability of a response. For electively mute children, verbal behavior is under the strong stimulus control of their parents and family. In the past, these children were considered extremely difficult to treat (Reed, 1963). However, behavioral techniques have recently been quite successful in extending the range of settings in which such children will talk. Reid, Hawkins, Keutzer, McNeal, Phelps, Reid, and Mees (1967) were able to condition a preschool girl to talk to seven experimenters and three peers in the space of one marathon day's treatment, using a combination of positive reinforcement and stimulus fading. In less rigorous manner, Nolan and Pence (1970) reported using the same general strategies to generate normal speaking patterns in a 10-yr-old selectively mute girl. Similarly, Norman and Broman (1970) used both fading techniques and a volume feedback device with a 12-yr-old boy. Sabatasso and Jacobson (1970) successfully extended these techniques to use with a hospitalized adult psychotic.

The present study sought to establish whether the stimulus fading procedure was a necessary condition to instating verbal behavior with a stranger. It tested the notion that positive reinforcement for verbal behavior and timeout for non-response to mands for verbalizations would be sufficient to bring about verbalization in the presence of a stranger.

Hence, two alternating conditions were used in the treatment of an electively mute girl. In one condition (the experimental condition), the child received reinforcement for responding to mands for verbal and motor responses in the presence of someone who already had stimulus control of such behavior, while a stranger was slowly faded into stimulus control. In the second

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condition (the control condition), another stranger made the same mands for verbal and motor responses under the exact same contingencies, but no fading procedure was used. During each treatment session, experimental and control periods were alternated with each other. A typical hour's treatment session might consist of three 10-min experimental periods alternating with three 10-min control periods.

PROCEDURE

Subject

Emma was 6-yr old and had been in kindergarten for eight months when the study began. She was the oldest of five children. All of the children showed a similar pattern of selective responding. Emma had not spoken in kindergarten, in 3 yr of Sunday School, or 1 yr of preschool. In kindergarten, she moved from place to place only if led by another child or the teacher. Although she lived just across the street from the school and played actively there, she had only to cross the street to become a pliable mannequin. In addition to not speaking, Emma never participated in any motor activities. She carried home the school craft materials and made, at home, the things that the others had made in class. She eagerly related to her mother all that went on in school each day, and was apparently quite attentive. In the clinic, her parents administered subtests of the WISC while being observed through a one-way mirror, and Emma performed well within the normal range. She also demonstrated that she knew the alphabet and could count and write numbers to 100; she could read several words, including the names of all the members of her family. Hence, it was established that she had the prerequisite skills for school. It was not a matter of new learning but of producing already acquired responses in the presence of new stimulus settings, or S^Ds.

General Experimental Design

The first phase of this treatment was conducted at the Psychology Clinic, University of Washington. The child was brought to the clinic by her mother three times each week. Each session with the child was divided into an equal number of alternating experimental and control periods. These periods were pre-scheduled and counterbalanced so that the child began every other session with an experimental period and alternate sessions with a control period. Typically, there were four tasks (numbers, alphabet, drawing, lotto) to each session, and these same four tasks were presented in both the experimental and control periods in counterbalanced order. Each task consisted of 20 items, 10 that required a motor response such as pointing, drawing, or writing, and 10 that required a one-word verbal response. An item requiring either a motor or verbal response was presented every 30 sec. Hence, experimental and control periods were equated for reinforcement contingencies, length of time, tasks presented. They differed only in the use of the fading procedure.

The steps used in fading Experimenter 1 into stimulus control of Emma's verbal and motor behavior are given in Table 1.

During the experimental periods, Mother and Emma sat at a table in the clinic playroom and were observed through a one-way mirror. As Emma responded appropriately to the task items administered by her mother, Experimenter 1 (experimenters are numbered in order in which they were faded into stimulus control) advanced through the successive steps of closeness given in Table 1. The mother dispensed candy to Emma for speaking out loudly enough for the observers to hear her and gave social praise for compliance with motor tasks. During the alternating control periods, Experimenter 3 took the place of the mother without any fading procedure. Experimenter 3 sat at the table and administered the same tasks under the same contingencies as did the mother during the experimental periods. Later in the study, a timeout contingency was initiated in both the experimental and control periods. If Emma did not respond to a request for verbalization, she had to

Table 1

Graded Steps of Closeness Used in Fading Experimenter I into Stimulus Control

0. *Neither visible nor audible*
   A. Neither visible nor audible
   B. Not visible but audible over radio
      (saying, "ask Emma question #1 or give Emma direction #17")
   C. Not visible but audible both over radio and from hall
1. *Visible at door*
   A. Visible and audible standing in hall, turned 180° away from Emma
   B. Visible and audible standing in doorway, turned 180°
   C. Visible and audible standing inside room, with door closed, turned 180°
   D. Visible and audible inside room, door closed, turned 135°
   E. Visible and audible inside room, door closed, turned 90°
   F. Visible and audible inside room, door closed, turned 45°
   G. Visible and audible facing with dark glasses on
   H. Inside room with door closed, facing, radio off
2. *Inside room halfway to chair*
3. *Inside room standing at chair*
4. *Inside room sitting in chair*
5. *Reading questions in unison with person already in stimulus control*
   A. Inside room reading task items in unison with mother and/or
      handing cards together
   B. Inside room reading the critical element of the task item alone and/or
      handing cards together except mother drops hand before Emma takes
   C. Inside room reading the critical element of task alone,
      handing cards alone
6. *Reading questions alone while person in stimulus control remains seated at table*
   A. Inside room reading all the directions alone,
      holding and handing cards
   B. Inside room mother silent, but watching
   C. Inside room mother reading at table
7. *Reading questions alone while person in stimulus control moves away from the table*
   A. Inside room mother reading with chair away from table
   B. Inside room mother reading with chair beside door
   C. Inside room mother in doorway
   D. Inside room mother in hallway
8. *Inside room mother absent*

sit in the timeout room for 1 min. Timeout was used more frequently in the control periods than in the experimental periods. Hence, the control and experimental periods were equated for length of time, rather than items administered during sessions where timeout was in force.

After Experimenter 1 had acquired stimulus control over Emma's verbal and motor behavior, Experimenter 2 was faded-in in a similar manner. Experimenter 3 still administered the alternating control periods. Finally, Experimenter 3 was faded-in, and following this four other persons were faded-in, including Emma's first-grade teacher. Just before school reopened in the fall, several children from her class were faded-in in the actual classroom.

Data Collection

An observer sat behind the one-way mirror and recorded data on whether or not Emma responded to each verbal or motor item administered during both the experimental and control periods. On two occasions, a second observer independently collected data. Reliability was computed as the number of verbal or motor task responses on which both observers agreed divided by the total number of verbal or motor items administered. Reliability checks on these two occasions showed that per cent

agreement of the two observers was 0.88 on motor items and 0.97 on verbal items.

The same observers collected data as to the closeness of the Experimenters to Emma during the experimental and control periods, respectively. Table 1 describes the scale used to assign a number to each step of closeness in the fading procedure. An average or mean closeness of Experimenter 1 was computed from the scale of closeness for each of the 10 days required to fade Experimenter 1 into stimulus control.

RESULTS

Figure 1 shows the course of the fading process for Experimenter 1. Each day, an average or mean of closeness was computed from the series of steps of fading achieved during that particular day. This scale of closeness is shown on the right-hand ordinate of Figure 1, and the closeness of Experimenter 1 is represented in the graph by a dashed line. The per cent of motor and verbal compliance of the child is plotted on the left-hand ordinate, and the child's behavior during experimental sessions is represented in the graph by the solid line. The days of treatment are plotted on the abscissa.

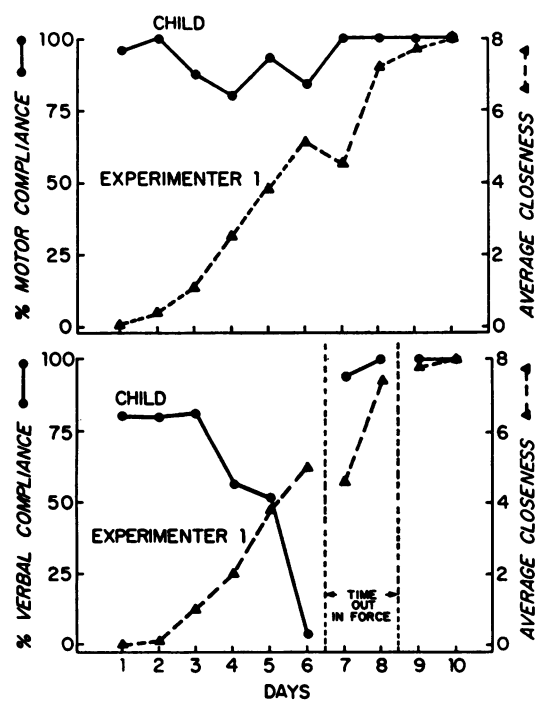

Fig. 1. Per cent compliance to mands for verbal and motor response during Experimental Periods as Experimenter 1 faded-in to stimulus control. A time-out contingency was in effect on Days 7 and 8.

Inspection of Figure 1 shows that during the first six days of treatment, as Experimenter 1 moved closer to Emma, her motor behavior dropped off slightly from what it had been when Experimenter 1 was not present. On the other hand, as Experimenter 1 moved closer, Emma's verbal behavior dropped off completely. Emma made neither verbal nor motor response to Experimenter 3 during the control periods.

On Day 7, a timeout contingency was put into effect. If Emma failed to respond to a verbal item, she was placed in a darkened timeout room for 1 min. With the timeout contingency in effect, Emma responded to all verbal and motor-task items presented during experimental sessions. The child responded to 100% of all mands for verbal and motor behavior on Days 8, 9, and 10, as Experimenter 1 moved closer and acquired complete stimulus control.

However, the timeout contingency had a quite different effect in the control sessions than it did in the experimental sessions. Figure 2 shows this in more detail. Figure 2 plots Emma's cumulative verbal response and the closeness of the Experimenters in both the experimental and control periods for Days 7 and 8. The numbers at the top of the graph refer to the experimenters. Experimenter 1 administered the experimental sessions during Days 7 and 8, while Experimenter 3 administered the control sessions. The upper segment of Figure 2 (Days 7 and 8) depicts the closeness of the two Experimenters during the experimental and control sessions. The lower segment of Figure 2 (Days 7 and 8) depicts the closeness of the two Experimenters during the experimental and control sessions. The lower segment of Figure 2 (Days 7 and 8) plots the cumulative verbal response of the child. Trials are plotted on the abscissa. Each instance of the use of timeout is shown on the graph.

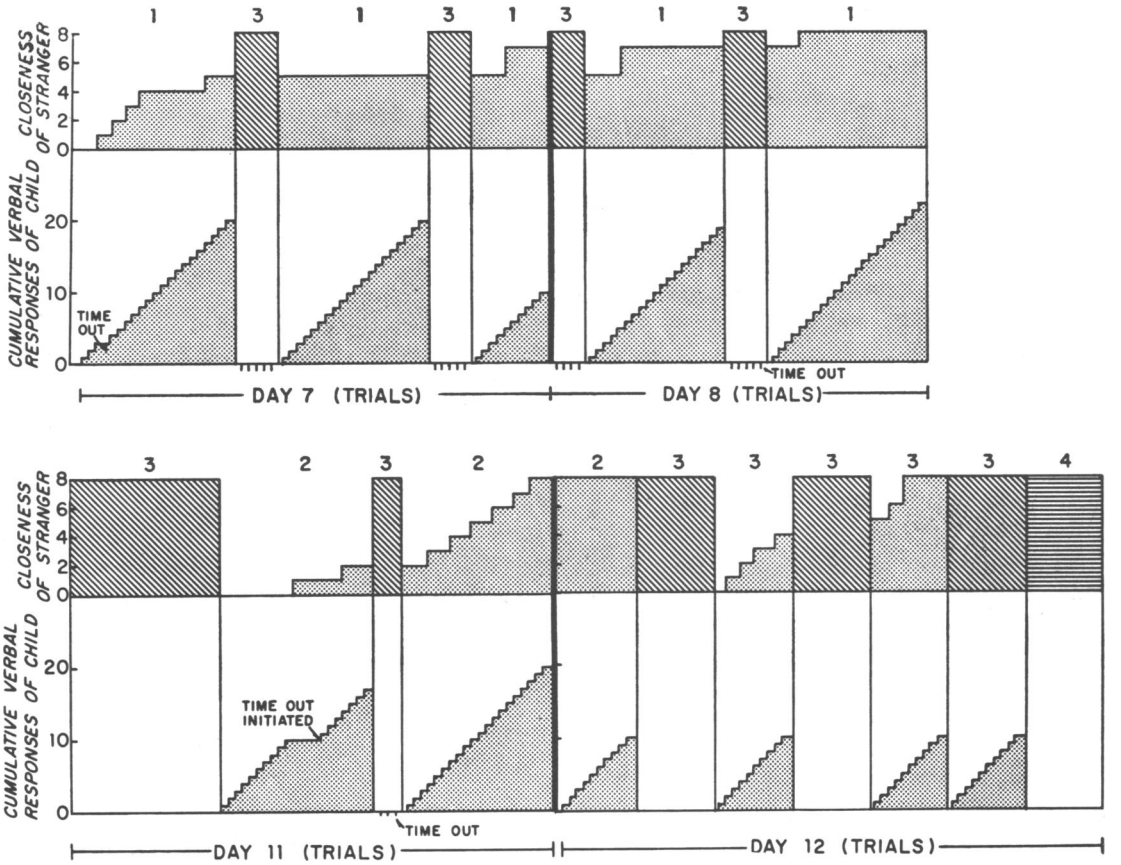

Fig. 2. Cumulative verbal response of the child during Experimental and Control periods. Experimenters are numbered in the order in which they were faded-in to stimulus control. Numbers at the top of the graph refer to experimenters. Days 7 and 8: Experimenter 1 administered the Experimental Periods, Experimenter 3, the Control Periods. Day 11: Experimenter 2 faded-in to stimulus control and Experimenter 3 administered the Control Periods. Day 12: Experimenter 3 continued to administer the Control Periods until he was completely faded-in to stimulus control. Experimenter 4 then administered the control period.

As shown in Figure 2, during the first experimental period of Day 7, Emma failed to respond to a mand for verbalization when Experimenter 1 became visible at the door to the playroom. Emma was placed in timeout and thence forward responded to all verbal and motor items as Experimenter 1 moved into the room, took the mother's place at the table, and the mother gradually left the room. In the control sessions, however, where the same contingencies were in effect, Emma was placed in timeout 19 times and continued to be completely unresponsive to mands for either verbal or motor response. In the experimental periods where a fading procedure was used, the combined contingencies of candy for verbalization and timeout for nonverbalization were quite successful in instating verbal and motor response with a stranger. In the control periods, where there was no fading procedure, the use of timeout was completely ineffective in generating either verbal or motor response.

To determine whether Emma's response would now generalize to another stranger, a probe was made at this point. Experimenter 2 administered a task to Emma without any fading procedure. Emma made no response.

Figure 2 (Day 11) shows the fading of Experimenter 2 into stimulus control during experimental periods. Experimenter 1 now took

the place of the mother and administered the tasks, as Experimenter 2 proceeded through the steps of closeness shown in Table 1. During control periods, Experimenter 3 maintained the same contingencies as during experimental periods but without the steps of fading. Figure 2 (Day 11) shows that as Experimenter 2 became visible, Emma ceased to respond. When the timeout contingency for non-response to requests for verbalization was once again stated, Emma immediately began to respond and continued to do so as Experimenter 2 proceeded to assume control and Experimenter 1 gradually left the room. During the control periods, Emma did not respond to Experimenter 3, even though she was placed in timeout three times.

During the next session, Experimenter 3 was faded-in, while again Experimenter 1 took the place of the mother. Experimenter 3 also continued to administer the control periods. Figure 2 (Day 12) shows this session. During the second experimental period, Experimenter 3 began the fading procedure without any timeout contingency. Emma responded to 100% of the items as Experimenter 3 advanced closer. During the second experimental session, Experimenter 3 had reached step 4 in the fading procedure (sitting at the table with Emma and Experimenter 1 but not saying anything). Both Experimenters 1 and 3 left the room at this point. Experimenter 3 reentered the room in the control period and administered items to Emma. Emma gave no response during the control period. Experimenter 3 left the room and then returned with Experimenter 1 and continued the steps of the fading procedure. By the end of this experimental period, Experimenter 3 was completely faded-in to stimulus control and Experimenter 1 had left the room. This time, when Experimenter 3 left the room and then returned to administer the control period, Emma responded to 100% of his requests.

A fourth person was then brought in as a probe for generalization. Experimenter 4 entered the room without any fading and administered a control period. As shown in Figure 2 (Day 12), Emma made no response to Experimenter 4.

At this point, the experiment moved to the child's school. Since the school was in summer recess, the empty classroom was available. First, Emma was shaped to walk to school alone. Then, three additional experimenters and the child's teacher for the coming year were faded-in in the classroom, using the same procedures described for the clinic. Each fading of a new experimenter was preceded by a probe to assure that the child would not yet respond directly to a stranger without the fading procedure. Fading was, however, accomplished with successively fewer trials. The sixth experimenter obtained an immediate response from the child when he entered as a probe. The child's teacher (Experimenter 7) also obtained an immediate response from the child. The first four experimenters maintained twice-weekly experimental sessions with the child and faded the candy reinforcers to a "point book" and subsequently to a daily report card during the remainder of the summer. Finally, in the week preceding the official beginning of school, the child attended half-hour sessions with her teacher daily, and an increasing number of peers (two to five) were present. On the first day of school, the child walked to class by herself, hung up her coat, and took her seat as directed by her teacher. When the roll was called, she, like the others, got up from her seat, went to the teacher, and received a name tag. Later that morning, with all the children seated around the teacher, Emma raised her hand when the teacher asked a question of the group, was called upon, and gave a correct response in a loud, clear voice.

Figure 3 shows the number of trials required to fade-in successive experimenters. The dotted line represents the number of trials required to fade-in Experimenter 1 before the timeout procedure was initiated. The solid line represents the number of trials required to fade-in successive experimenters after the timeout procedure was initiated. While it should be clear that a great deal of the variance represented in this

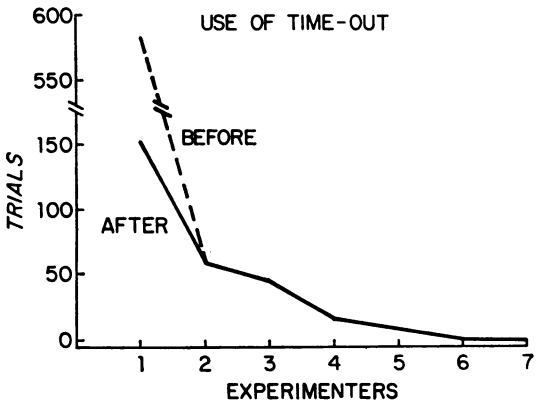

Fig. 3. Number of trials to fade successive experimenters in to stimulus control.

figure is due to the experimenter's judgement as to how quickly to proceed with fading, there is a definite trend indicating that each successive experimenter was adapted to more quickly by the child.

DISCUSSION

This study offers evidence that the treatment of elective mutism is best effected through the combined use of a stimulus fading procedure and contingency management. The use of positive reinforcement for responding and timeout for not responding during control periods was not sufficient to instate verbal and motor response in the presence of strangers. It appears that the use of the fading procedure was a necessary component of the treatment process. The role of the timeout procedure is somewhat less clear. In this particular instance, the addition of the timeout contingency facilitated the effect of the stimulus fading procedure. It is curious that the effect of timeout was so different in the experimental and control periods. During the experimental periods, the fading procedure was ineffective until it was combined with the use of timeout for non-response. During the control periods, timeout was ineffective, seemingly because it was not used in conjunction with stimulus fading. That the meaning (defined in terms of behavioral response) of the same contingency procedure changes within two different stimulus contexts is an intriguing area of study.

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